NATURAL RESOURCES CONSERVATION SERVICE

WASTE UTILIZATION (ACRE)

CODE 633

MONTANA CONSERVATION PRACTICE SPECIFICATION / JOB SHEET

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MT-CPA-223
Rev 08/01

MANURE NITROGEN CREDITING

PRODUCER _____ PLANNING DATE _____

ANIMAL (SPECIES)			
FORM (LIQUID OR SOLID)			

NITROGEN

TOTAL AVAILABLE NITROGEN IN MANURE
(lbs. N/1,000 gal or lbs. N/ton)
ANALYSIS SOURCE: MT-CPA-227 ___ MT-CPA-228 ___

1ST YEAR AFTER APPLICATION [1]			(a)
2ND YEAR AFTER APPLICATION [1]			(a)
3RD YEAR AFTER APPLICATION [1]			(a)

APPLICATION RATE (1,000 gal/ac. or tons/ac.) [2]

1ST YEAR			(b)
2ND YEAR			(b)
3RD YEAR			(b)

NITROGEN APPLIED (lbs./ac) = (a) x (b)

_____ CROP YEAR (1ST YEAR) [3]			
_____ CROP YEAR (2ND YEAR)			
_____ CROP YEAR (3RD YEAR)			

[1] From Estimating Manure Nitrogen, Form MT-CPA-227, line 8, or Manure Test Nitrogen, Form MT-CPA-227, line 7.

[2] Manure application should be scheduled to meet plant needs using Nutrient Management Specification, Nutrient Checklist, Form MT-ECS-112.

[3] Indicate crop year when nutrients will be available. lbs./ac transfers to Nutrient Checklist, Form MT-ECS-112. (Nutrient Management Design and Specification.)

MANURE NITROGEN CREDITING continued

TABLE 1. Nitrogen Availability and Loss as Affected by Method of Application

BROADCAST – INCORPORATE [1]			INJECTION		SPRINKLE
<12 hrs.	<4 days	>4 days	Sweep	Knife	
% Total N					
70	60	50	90	95	75

[1] Categories refer to the length of time between manure application and incorporation

PHOSPHORUS and POTASSIUM

Pounds per acre P_2O_5 and K_2O available to crops in the 1st year are found by multiplying P_2O_5 or K_2O in manure (from analysis or TABLE 2) times the selected application rate times 80% and 90%, respectively. **No 2nd or 3rd year credits are given.**

If a manure analysis was obtained, list total phosphorus and total potassium, as received. (pounds/ton or pounds/1,000 gal.) Attach manure analysis.
Be sure to enter elemental values only from manure analysis, i.e., P and K—not K_2O or P_2O_5.

TOTAL P = _____ lbs. **TOTAL K** = _____ lbs.

FORM: **Liquid** _____ **Solid** _____

From manure analysis, calculate lbs./ac. of P_2O_5 and K_2O applied:

_____ **X** **2.3** **X** _____ **X** **0.8** **=** _____
P–P_2O_5 Conv. | (1,000 GAL./AC. OR TONS/AC.) APPLICATION RATE | (LBS./AC.) P_2O_5

_____ **X** **1.2** **X** _____ **X** **0.9** **=** _____
K–K_2O Conv. | (1,000 GAL./AC. OR TONS/AC.) APPLICATION RATE | (LBS./AC.) K_2O

If manure analysis is not available, determine of P_2O_5 and K_2O produced from TABLE 2 or from:

Has manure been separated? ❑ YES ❑ NO Applied Form? ❑ LIQUID ❑ SOLID

_____ / _____ **X** _____ **X** **2.3** **=** _____ ADJUSTMENT FOR SEPARATION _____
P lbs./day | Cu. Ft./Day. | Cu. Ft./Ton* | P–P_2O_5 Conv. | P_2O_5 lbs./ton or 1,000 Gallons

_____ / _____ **X** _____ **X** **1.2** **=** _____ ADJUSTMENT FOR SEPARATION _____
K lbs./day | Cu. Ft./Day. | Cu. Ft./Ton* | K–K_2O Conv. | K_2O lbs./ton or 1,000 Gallons

* Average volumetric weight for all animals.

Calculate lbs./ac. of P_2O_5 and K_2O applied:

(LBS./1,000 GAL. OR LBS./TON) _____ **X** Application Rate (1,000 GAL./AC. OR TONS/AC.) _____ **X** **0.8** **=** (LBS./AC.) _____
P_2O_5 Manure | P_2O_5

(LBS./1,000 GAL. OR LBS./TON) _____ **X** Application Rate (1,000 GAL./AC. OR TONS/AC.) _____ **X** **0.9** **=** (LBS./AC.) _____
K_2O Manure | K_2O

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ESTIMATING MANURE NITROGEN

Go to ESTIMATING BEEF FEEDLOT MANURE PRODUCTION Worksheet

1. Is this a beef open feedlot management system? ❑ YES ❑ NO

										TOTAL LBS. N
	N_{excr}	=		X		X		=		
	N_{excr}	=		X		X		=		
	N_{excr}	=		X		X		=		
ANIMAL TYPE			NO. OF ANIMALS		DAYS		LBS. N/DAY		LBS. N	

Are liquids and solids separated? ❑ YES ❑ NO **Manure Form** ❑ LIQUID ❑ SOLID

Pounds N based on Separated Manure Forms

					LIQUIDS		SOLIDS	
N_{excr} =		X		=		LBS. N		LBS. N

2. Estimate portion of nitrogen retained after storage and treatment using TABLE 3. N_{retain}

Manure Management System: _____

3. Estimate inorganic nitrogen converted from manure nitrogen (mineralization) and becoming available after application using TABLE 4.

N_{conv} 1st year = _____ N_{conv} 2nd year = _____ N_{conv} 3rd year = _____

4. Estimate portion of nitrogen remaining after denitrification using TABLE 5.

N_{deni} 1st year = _____ N_{deni} 2nd year = _____ N_{deni} 3rd year = _____

5. Estimate portion of nitrogen remaining due to application of manure using TABLE 1 **N_{appl} 1st year =** _____
(No application reduction is taken second or third years when manure is applied first year only).

Application Method: _____ Time (IF APPLICABLE): _____ HOURS OR DAYS

6. Calculate nitrogen ($N0_3$) available for plant uptake for each year.

N_{excr}	X	N_{retain}	X	N_{conv} 1st yr.	X	N_{deni} 1st yr.	X	N_{appl} 1st yr.	=	N_{avail}
	X		X		X		X		=	
	X		X		X		X		=	
	X		X		X		X		=	

7. Compute total pounds of manure produced, as excreted. (Use TABLE 2)

Solid Form (USE FOR COMBINED SLURRY/SEMI-SOLID FORMS AND SEPARATED SOLID FORM)

	X		X		/	_____	=	**Tons of Manure**
NO. OF ANIMALS		DAYS		CU. FT./DAY		CU. FT./TON*		

Liquid Form (USE FOR SEPARATED LIQUID FORM ONLY)

	X		X		/	_____	=	**1,000 Gallons of Manure**
NO. OF ANIMALS		DAYS		CU. FT./DAY		GAL./CU. FT*		

* Average volumetric weight for all animals.

8. Calculate total pounds of available nitrogen per ton of manure produced.

	/		=		Lbs. Available N/ton or N/1,000 Gal.
#AVAIL. N 1ST YR		TONS OR GALS.			
	/		=		Lbs. Available N/ton or N/1,000 Gal.
#AVAIL. N 2ND YR		TONS OR GALS.			
	/		=		Lbs. Available N/ton or N/1,000 Gal.
#AVAIL. N 2ND YR		TONS OR GALS.			

Specification MT633-4

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MT-CPA-227
Rev 08/01

ESTIMATING BEEF FEEDLOT MANURE PRODUCTION

ANIMAL TYPE COW, FEEDER, BULL, CALF, HEIFER	NUMBER OF ANIMALS	AVERAGE WEIGHT	NUMBER OF DAYS IN LOT/YEAR	N LBS/DAY/1,000#	P LBS/DAY/1,000#	K LBS/DAY/1,000#

ANIMAL TYPE COW, FEEDER, BULL, CALF, HEIFER	EXCRETED VOLUME (CU. FT./DAY)	TOTAL N (LBS./YR)	TOTAL P (LBS./YR)	TOTAL K (LBS./YR)	TOTAL SOLIDS (CU. FT./YR.)	TOTAL SOLIDS (TONS/YR.)
TOTAL						

				TONS/AC.				(LBS./AC.)
	X	2.3			X	0.8	=	
LBS P/TON		$P–P_2O_5$ Conv.		Application Rate				P_2O_5
				TONS/AC.				(LBS./AC.)
	X	1.2			X	0.9	=	
LBS K/TON		$K–K_2O$ Conv.		Application Rate				K_2O

NRCS, MT
August 2001

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NATURAL RESOURCES CONSERVATION SERVICE

MT-CPA-228
Rev 01/02

MANURE TEST NITROGEN

DATE: _____

1. From manure analysis, list total nitrogen, as received, (pounds/ton or pounds/1,000 gal.). ***Attach manure analysis.***

❑ LIQUID ❑ SOLID TOTAL N = [ ] LBS.

2. Estimate inorganic nitrogen converted from manure nitrogen (mineralization) and becoming available after application using TABLE 4.

N_{conv} 1st year = [ ] N_{conv} 2nd year = [ ] N_{conv} 3rd year = [ ]

3. Estimate portion of nitrogen remaining after denitrification using TABLE 5.

N_{deni} 1st year = [ ] N_{deni} 2nd year = [ ] N_{deni} 3rd year = [ ]

4. Estimate portion of nitrogen remaining due to application of manure using TABLE 1. N_{appl} 1st year = [ ]
(No application reduction is taken second or third years when manure is applied first year only).

Application Method: _____ Time (IF APPLICABLE): _____ HOURS OR DAYS

5. Calculate nitrogen ($N0_3$) available for plant uptake for each year.

N_{test}	X	N_{conv} 1st yr.	X	N_{deni} 1st yr.	X	N_{appl} 1st yr.	=	N_{avail}	
	X		X		X		=		LBS. N 1ST YEAR
	X		X		X		=		LBS. N 1ST YEAR
	X		X		X		=		LBS. N 1ST YEAR

6. Compute total pounds of manure produced, as excreted. (Use TABLE 2) ***Multiple animal types can be entered.***

Is this a beef open feedlot management system? ❑ YES ❑ NO

Complete for Solid Form Analysis:

NO. OF ANIMALS		DAYS		CU. FT./DAY		CU. FT./TON*			
	X		X		/	32	=		TONS OF MANURE
	X		X		/	32	=		TONS OF MANURE
	X		X		/	32	=		TONS OF MANURE

Complete for Liquid Form Analysis:

NO. OF ANIMALS		DAYS		CU. FT./DAY		GAL./CU. FT.*			
	X		X		/	7.48	=		1,000 GALLONS OF MANURE
	X		X		/	7.48	=		1,000 GALLONS OF MANURE
	X		X		/	7.48	=		1,000 GALLONS OF MANURE

7. Calculate total pounds of available nitrogen per ton of manure produced.

[ ] / [ ] = [ ] LBS. AVAILABLE N/TON OR N/1,000 GALLONS
#AVAIL. N 1ST YR. TONS OR GALS.

[ ] / [ ] = [ ] LBS. AVAILABLE N/TON OR N/1,000 GALLONS
#AVAIL. N 2ND YR. TONS OR GALS.

[ ] / [ ] = [ ] LBS. AVAILABLE N/TON OR N/1,000 GALLONS
#AVAIL. N 3RD YR. TONS OR GALS.

* Average volumetric weight for all animals.

Specification MT633-6

NO INFORMATION

NRCS, MT
January 2002

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TABLE 2. Daily Manure Production (AS EXCRETED)

ANIMAL	SIZE LBS.	PRODUCTION CU. FT./DAY	PERCENT WATER	NUTRIENT CONTENT		
				N LBS. / DAY	P LBS. / DAY	K LBS. / DAY
Dairy Cow	150	0.190	87	0.060	0.01000	0.04000
	250	0.320	87	0.100	0.02000	0.07000
	500	0.660	87	0.200	0.03600	0.14000
	1000	1.300	87	0.410	0.07300	0.27000
	1400	1.850	87	0.570	0.10200	0.38000
Beef	<750	0.930	88	0.300	0.10000	0.20000
	1000	0.950	88	0.310	0.11000	0.24000
	1250	1.000	88	0.330	0.12000	0.26000
Swine						
Nursey	35	0.038	90	0.016	0.00520	0.01000
Growing	65	0.070	90	0.029	0.00980	0.02000
Finish	150	0.160	90	0.068	0.02200	0.04500
	200	0.220	90	0.090	0.03000	0.05900
Gestate	275	0.150	90	0.062	0.02100	0.04000
Sow & litter	375	0.540	90	0.230	0.07600	0.15000
Boar	350	0.190	90	0.078	0.02600	0.05100
Poultry						
Layers	4	0.0035	75	0.0029	0.00110	0.00120
Broilers	2	00.024	75	0.0024	0.00054	0.00075
Turkey	10	0.0069	75	0.0074	0.00280	0.00280

TABLE 3. Nitrogen Remaining After Storage, Treatment, and Application

MANURE MANAGEMENT SYSTEM	PORTION REMAINING (%)
Oxidation ditch, effluent storage	20 to 30
Anaerobic lagoon or storage pond after 50% dilution	10 to 30
Open lot surface storage	40 to 60
Aerobic lagoon	45 to 55
Roofed storage or manure pack	60 to 75
Shallow, open, manure storage pond	70 to 80
Stacking facility	65 to 75
Deep, open, manure storage pond	70 to 80
Liquid manure tank, covered	80 to 90

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TABLE 4. Organic Waste Decay Rate (MINERALIZATION—SOIL-INCORPORATED "N" CONVERTED TO INORGANIC "N") *

TYPE OF WASTE	1ST YEAR AFTER APPLICATION % AVAILABLE	2ND YEAR AFTER APPLICATION % AVAILABLE	3RD YEAR AFTER APPLICATION % AVAILABLE
Fresh poultry manure	90	2	1
Fresh swine manure	75	4	2
Fresh cattle manure	70	4	2
Fresh sheep and horse manure	60	6	2
Liquid manure, covered tank	65	5	3
Liquid manure, storage pond	65	5	3
Solid manure, stack	60	6	2
Solid manure, open pit	55	5	2
Manure pack, roofed	50	5	2
Manure pack, open feedlot	45	5	3
Storage pond effluent	40	6	3
Oxidation ditch effluent	40	6	3
Aerobic lagoon effluent	40	6	3
Anaerobic lagoon effluent	30	6	3
Digested sewage sludge	35	5	2

* If irrigated, reduce 1st year mineralization by 5%.

TABLE 5. Nitrogen Remaining After Denitrification

SOIL DRAINAGE CLASS	REMAINING INORGANIC "N" %
Excessively or somewhat excessively drained	97
Well drained	90
Moderately well drained	85
Somewhat poorly drained	80
Poorly drained	70
Very poorly drained	60